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AUTHOR Ehindero, Olushola J.
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ABSTRACT

In this study, 80 prospective elementary school teachers, having no teaching experience, were administered six Piagetian tasks in order to classify them as concrete or formal thinkers. They were then required to complete a series of teaching tasks consisting of two phases. Phase I required the subjects to prepare a lesson plan, arrange a series of instructional materials appropriate for several grade levels, and diagnose a series of learning difficulties. In Phase II, the subjects were required to execute their teaching plans. As a result, a significant relationship was found between levels of cognitive development and ability of the prospective elementary school teachers to identify and provide relevant instructional materials appropriate to the grade level to be taught. Thus, the subjects who were concrete operational provided materials that were mostly concrete. They provided more and varied materials that capitalized on the multi-sensory approach to learning. On the other hand, the formal operationals did very well in planning teaching strategies but were unable to effectively actualize their teaching intentions. (BB)

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# ACTUALIZING TEACHING INTENTIONS BY SOME CONCRETE AND FORMAL OPERATIONAL PROSPECTIVE ELEMENTARY SCHOOL TEACHERS IN NIGERIA

By

Olushola J. Ehindero
Lecturer in the Department
of Special Education and Curriculum
Studies
University of Ife
Ile-Ife, Nigeria

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# ACTUALIZING TEACHING INTENTIONS BY SOME CONCRETE AND FORMAL OPERATIONAL PROSPECTIVE ELEMENTARY SCHOOL TEACHERS IN NIGERIA

## Introduction

Although Piaget's theory of intellectual development is exerting strong influences on research and theory in science education, the instrumental value and practical implications of the theory as it relates to classroom pedagogy has only recently become a major concern to science educators. Science educators are agreed that the development of the architectonics of formal operational schemata among Prospective Elementary school teachers is an important goal in science teaching, but as of now little or no empirical investigation has been made on how prospective elementary school teachers operationalize these cognitive skills in the planning and subsequent actualization of their teaching intentions in practical classroom situations.

Attempts to study how intentions are actualized have not been related to the levels of cognitive development among prospective elementary school teachers (PEST). Wispe (1951) investigated the effects of permissive/directive behavioural patterns on teachers' ability to successfully conduct their teaching intentions. Olivero, Reeback and Ostereich (1971), set up performance standard and investigated whether or not teachers were able to implement curricular program with reference to a predetermined performance standard.

Recently Aisiku (1977), using a video/Audio tapes technique, investigated the extent to which some Nigerian high school teachers actualize their stated teaching intentions in practical classroom situation. According to Aisiku

> As learning theorists study students or learners' characteristics to speculate improvements on learning, teacher characteristics should be studied to improve teaching.

One of the characteristics of teachers which needs to be studied is their level of cognitive development as related to their ability to actualize stated teaching intentions.

One theoretical contribution gleaned from the work of Piaget is the distinction he draws between execution and reflection. The intention to do something requires some basic cognitive structures (skills) which again assumes a clear-cut time-table for executing it. However, stated intentions does not guaranttee successful actualizations of these intentions in practical classroom situation.

Problem Statement

The present study was designed to investigate the performances of concrete and formal PEST on teaching tasks. The specific questions asked in the study were whether significant differences existed between concrete and formal thinkers in their ability to (i) plan a hypothetical teaching

program (including a diagnosis of learners' major and minor problem areas) of a topic of their choice i.e. their teaching intentions and (ii) actualize these intentions in practical classroom teaching situations. In effect the study investigated possible relationships between levels of cognitive development and performance on teaching tasks.

Some basic assumptions on which the study was grounded were (a) that teaching is an intentional human activity consisting of a series of multitiered possible tasks (b) that in the activity called teaching, teachers attempt to provide opportunities conducive for learners to attain stated instructional objective (c) that some skills, among them cognitive, are employed during the deployment of teaching intentions.

Procedure:

One hundred and sixty Prospective elementary school teachers were randomly selected from a large teacher training institution in Oyo State of Nigeria. They were administered 6 Piagetian tasks. Based on their performances on these tasks, 40 concrete and 40 formal thinkers were invited to participate in the study. Their ages range from 18 to 23 years with a mean age of 20 years. These students were being prepared to teach elementary school children under the Universal Primary Education Programme (UPE). None of the Ss had teaching experiences

before, but they had taken courses in teaching methods and the psychology of learning.

Instrument

The six classical Piagetian tasks used to assess the subjects' levels of cognitive development were (i) conservation of volume using clay (ii) the elimination of contradiction (law of floating bodies) (iii) the operations of exclusion (Oscillation of a Pendulum), (iv-vi) combinatorial, proportional and syllogistic reasoning tasks.

The teaching tasks (TT) consisted of two phases. Phase I, the intention phase, required the Ss to prepare a lesson plan of a topic of their choice including possibilities regarding how the lesson could be effectively taught to enhance students' comprehension. Also each S was required to provide a series of instructional materials appropriate for teaching his chosen topic and adequate to the several grade levels to be taught.

Phase II of the teaching task was concerned with the actualization of already stated intentions. During this phase it was assumed that Ss operationalize their various skills (intellectual and teaching) to actualize stated intentions. Also during this phase interaction patterns were observed by 3 experienced elementary school teachers. Those patterns were categorized as either Teacher-centered (1point), pupil-centered (2 points) or teacher-pupil centered (3 points).

Inter-observer agreement was calculated to be 86%, which was considered satisfactory for this type of observation.

## RESULTS

Table I

Intercorrelations Between variables in both phases of the teaching for concrete and formal thinkers.

| | Concrete Ss (N=40) | | | | Formal Ss (N=40) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Stating Teaching Intentions | - | .27 | .24 | .61** | - | .53** | .48** | .32 |
| Provision of apropriate and meaningful instructional materials | | - | .33 | .56** | | - | .41* | .38* |
| Patterns of classroom interaction | | | - | .38* | | | - | .31 |
| Actualizing teaching intention | | | | - | | | | - |

* $p < .05$

** $p < .01$

Table I shows the intercorrelations of the variables in both phases of teaching-intention and actualization - among concrete and formal Ss. All variables were positively correlated. Among concrete Ss significant correlations ($p < .01$) were found to exist between accuracy in stating teaching intentions, provision of appropriate instructional materials and actualization of intentions. Among formal thinkers teaching intentions correlated highly with provision of appropriate and meaningful instructional materials, and patterns of classroom interactions. Concrete thinkers better actualized their teaching intentions than formal thinkers in practical elementary school classroom.

Table II shows the mean scores and standard deviations on phases I and II of the teaching tasks. These means show that formal operational Ss achieved higher than their concrete counterparts in all variables with the exception of that concerning the actualization of teaching intentions.

A t-test comparison of concrete and formal thinkers on variables in the two phases of teaching yielded the following results:

(a) Formal Ss performed better than concrete Ss in stating their teaching intentions ($t=3.94$ $df.78$ $p < .01$)

(b) Formal Ss performed better than concrete Ss in providing appropriate and meaningful instructional materials ($t=2.33$ $df=78$ $p < .05$)

(c) Concrete Ss performed better than formal Ss in their interactions with the elementary school children ($t=2.61$ $df.78$ $p < .05$)

(d) Concrete Ss performed better than formal Ss in actualizing stated teaching intentions ($t=6.5$ $df.78$ $p < .01$)

Although formal thinkers generated far more teaching intentions than concrete thinkers, the later group was on the average better able to actualize the very few intentions that they generated.

Table II

Means and standard deviations on phases I and II of the teaching tasks

| | Concrete | | Formal | |
|---|---|---|---|---|
| | X | SD | X | SD |
| Teaching intentions | 6.42 | 2.42 | 8.76 | 3.20 |
| Instructional materials | 5.63 | 3.14 | 7.83 | 3.42 |
| Actualizing intentions | 25.64 | 6.31 | 19.45 | 6.9 |

Discussion and Implication

This exploratory study sought to determine whether levels of cognitive development were related to planning and stating of teaching intentions and successful actualization of teaching intentions in practical classroom situations among some prospective elementary school teachers in Nigeria. Result of the study showed that although concrete operational Ss actualize their intentions more effectively than their formal counterparts, they (formal operational Ss) were more successful in (a) stating their intentions and (b) identifying appropriate and meaningful instructional materials.

The elementary classroom "culture" which teachers encounter is typically and potentially very unstructured. Such a "culture" is characterized by uncertainty, ambiguity, role conflicts, complex student-teacher interactions and instructional content decision-making. In such a "culture" the successful execution of teaching intentions involves both rational and spontaneous processes i.e. both intellectual and interactive activities. According to Jackson (1962):

> The spontaneous part of teaching takes place predominantly in the interactive or classroom setting ..... Since pupils, to some extent, control what the teacher does and since a multitude of classroom events occur

rapidly and are dealt with as they happen, there is seldom adequate opportunity to reason what is right. Data presented on Tables I and II indicated the importance of the rational (intellective) aspect in teaching activities. The data also indicated that successful performance on certain Piagetian tasks at the formal level did not guarantee effectiveness in teaching particularly at the primary school level.

With due recognition to the limitations imposed by a study of this nature, one should be very cautious in drawing conclusions. More is involved in executing teaching intentions than ability to be formal operational. Teaching requires certain skills. One may ask whether abilities related to Piagetian schema at the formal level are sufficient for an individual to perform successfully across tasks. Pallrand, Piburn and Baby (1977) stated that

> Ability related to the Piagetian schema ...are important to success in science courses. Perhaps it is an over simplification to think of formal thought as an overall ability enabling one to function successfully across a broad spectrum of tasks.

It is to be recalled that Piagetian schema (in contrast to Gagne's task analysis) deals not so much with knowledge relevant to success in particular task (e.g. teaching tasks as viewed in this study) but with logical and mathematical ways of tackling problems which are assumed to be content-free.

In our efforts to promote formal thought among prospective elementary school teachers emphasis should be put on programs which will expose them to the complex nature of teaching. Programs that would alert them to both the intellectual and spontaneous processes required for successful teaching. It is possible that experiences gained during the method's class influenced the actualization of teaching intentions. Experiences gained in such courses were supposedly internalized differently and utilized with varying degrees of sophistication. However no attempt was made in this study to assess the impact of these experiences on Ss ability to actualize stated intentions.

An unexpected finding of this study was that concrete Ss actualized their teaching intentions better than formal thinkers. No consistent reasons are apparent for this finding. A possible reason is that the experienced elementary school teachers who rated the actualization phase of the teaching might be bias in their observation i.e. they might be looking for interactions and teaching that were mostly concrete. It may also be possible that formal thinkers found it difficult to

relate with concrete thinkers in formal classroom settings. Both of these possibilities were not investigated in this study. Also the check-list might also be inherently difficient in evaluating actualization of teaching intentions particularly at primary school level. As an exploratory study much more research is needed to ascertain what variables influence concrete and formal thinkers' abilities to actualize their stated teaching intentions.

Recommendations

Research is need to determine why some formal thinkers can't successfully actualize their teaching intentions especially in practical elementary school classrooms. Further research is needed to investigate why logical rules, relations such as reciprocity functional independence and other rules of logic some of which are utilized in solving Piagetian tasks at the formal level may not be adequate for solving elementary classroom problems. Are these rules too logical, too structured resistant to the spontaneous and usually too complex classroom problems.

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10. Effectiveness in bringing lesson to a close effective questioning to emphasize main points of the lesson.....0 1 2 3

## CHECK-LIST FOR ACTUALIZING TEACHING INTENTIONS

1. Diagnosis of learning events, exploring students' entry behaviour relevant previous knowledge during introduction and as advance organizers.....0 1 2 3.
2. Awareness of stated teaching intentions including strategies for effecting intentions.....0 1 2 3
3. Knowledge of and effectiveness in deploying teaching intentions including the use of verbal and non-verbal behavioural cues.....0 1 2 3
4. Logical sequence i.e. inter-relationships and integration of the structure of knowledge in subject matter presentation.....0 1 2 3
5. Types and effective use of questions to determine level of students comprehension and for securing feedback on the teachers' performance.....0 1 2 3
6. Practicality: Emphasis on the concrete and realistic more than the speculative hypothetical or abstract.....0 1 2 3
7. Guidance of the class.....0 1 2 3
8. Community: Emphasis on cohesiveness, supportiveness and sympathy as well as provision of opportunity for bearners to share their experiences.....0 1 2 3
9. Instructional materials are concrete and (manipulatable) abstract. Instruction based on students level of comprehension. Teacher provides opportunity for pupils to interact with materials.....0 1 2 3

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